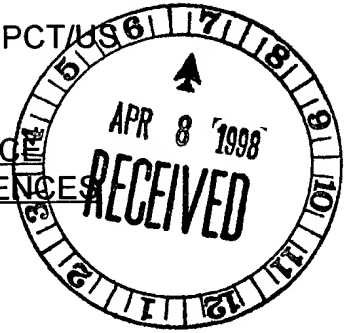




PATENT

Docket No. H 1215/1556 PCT/US 6



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re: Application of  
Kluth et al

Serial No. 08/702,625

Filed: 8/23/96

Title: FOAM PLASTIC FROM DISPOSABLE PRESSURIZED CONTAINERS

Examiner: J. Cooney

Art Unit: 1207

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231, on MARCH 26, 1998.

MARCH 26, 1998  
Date

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MARLENE CAPRERI  
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BRIEF ON APPEAL

Assistant Commissioner for Patents  
Washington, DC 20231

Sir:

Appellants herewith submit a Brief on Appeal from the EXAMINER'S FINAL  
REJECTION of claims 15-68, dated September 16, 1997.

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REAL PARTY IN INTEREST

The application is assigned to Henkel KGaA, TFP/Patentabteilung, D-40191  
Duesseldorf, Germany.

RELATED APPEALS AND INTERFERENCES

Appellants are not aware of any appeals or interferences which will directly affect  
or be directly affected by or have a bearing on the Board's decision in the present  
appeal.

STATUS OF CLAIMS

Claims 15-68 are pending in the application. Claims 1-14 have been cancelled.  
All of the claims stand rejected under 35 U.S.C. § 102(b) or under 35 U.S.C. § 103(a)  
over U.S. Patent 4,413,111 Markusch et al. All of the pending claims are the subject of  
this appeal.

STATUS OF AMENDMENTS

All amendments which have previously been submitted in the application have  
been entered. Appellants herewith submit amendments to claims 34, 37 and 50 for  
entry in the application. The rejection will be discussed as if the amendments to claims  
34, 37 and 50 have been entered.

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### SUMMARY OF THE INVENTION

The invention is a system for forming a foam plastic, uses for the foam plastic, compositions for forming the foam plastic, methods of use of the foam plastic, foam compositions and a method for producing the system (page 1 of the application). The system of the invention provides considerably reduced emissions of diphenylmethane diisocyanate during the processing (page 3 line 16-19).

The system of the invention provides a container, that within 24 hours after releasing the foam from the container, has a content of diisocyanate monomer of less than 2% by weight (page 4 lines 13-16).

One solution for providing the container of the system with a low content of diisocyanate monomers is to provide a polymerizable composition which has a low content of diisocyanate monomers (page 4 lines 20, 21).

The result can also be achieved by the addition of a trimerization catalyst<sup>component</sup> to be added immediately before or after foaming or ~~to add~~ an OH compound<sub>to be added</sub> to the composition remaining in the container after foaming (page 4 lines 24-28).

The composition necessarily contains at least one isocyanate prepolymer, at least one catalyst for the reaction of the isocyanate group with an OH group, at least one blowing agent and at least one foam stabilizer. In addition, other additives, for example, solvents, flame proofing agents, plasticizers, cell regulators, and anti-agers may be added. Within the context of the invention, an "isocyanate prepolymer" is an

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oligomer containing reactive NCO groups which is involved as a pre-adduct in the formation of the polymer. (page 5 line 4-6.). Preferred prepolymers are formed by the reaction of isophorone diisocyanate or 2,4-tolylene diisocyanatotrimethylolpropane (page 5, lines 25-30). Polymer MDI which has a functionality of more than 2.3 and preferably in the range of 2.4 to 2.7 is useful in the practice of the invention (page 9 line 6-9). The reactive isocyanate-containing compounds based on MDI are characterized by a diisocyanate content of less than 20% by weight, an NCO functionality of 2.7 to 5, and an NCO content of 26.0 to 30.0% by weight (page 11 lines 13-29).

Other polyisocyanates and isocyanate prepolymers are characterized by an isocyanate monomer content of less than 3% by weight, an NCO functionality of 2 to 5 and an NCO content of 8 to 30% by weight (page 11 lines 22-28).

The pressurized containers of the system of the invention contain 50 to 90 and preferably 60 to 85% by weight of an isocyanate compound, 0.1 to 5% and preferably 0.5 to 20% by weight of catalyst, 5 to 35 and preferably 10 to 25% by weight of a blowing agent and 0.1 to 5% and preferably 0.5 to 3% of a foam stabilizer and up to 20 and preferably 3 to 15% by weight of a plasticizer. (Page 11 line 26 thru page 13 line 2). The composition can contain optional materials such as flame proofing agents in the amount of 2 to 50% by weight, and other optional additives in an amount of 0.1 to 3% by weight can be in the composition (page 13 lines 3-5).

Examples 1-10 present compositions containing isocyanate prepolymers formed

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by reaction of a cyclotrimer with ethylene glycol. Cyclotrimers of isophorone diisocyanate and hexane diisocyanate are shown. The formation of low diisocyanate content polymer methylenediphenylisocyanate (MDI) by removal of diisocyanate and monoisocyanate compositions from a mixture is shown. (Example 10).

### ISSUES

1. Does an isocyanate prepolymer formed from a diisocyanate and a polyhydroxy compound with a diisocyanate content below 2% by weight and an NCO group content less than 2% by weight anticipate or make obvious the present invention?
2. Does a reference which does not mention a foam plastic anticipate or make obvious the present invention?
3. Does a composition which cannot be used to make a foam plastic, due to a low content of NCO groups, anticipate or make the present invention obvious?
4. Is the system of the present invention anticipated or obvious over a reference which discloses an isocyanate prepolymer with a diisocyanate content below 2% by weight and an NCO group content less than 2% by weight?

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### GROUPING OF THE CLAIMS

The claims do not stand or fall together. Each claim must be considered individually.

### ARGUMENT

The invention is a system for the production of plastic foam. The system comprises: a disposable pressurized container containing a composition comprising, at least one polyisocyanate or isocyanate prepolymer, at least one catalyst for the reaction of an isocyanate group with an OH group, at least one blowing agent and at least one foam stabilizer, wherein not later than one day after application of plastic foam from the disposable pressurized container, the residue left in the pressurized container has a diisocyanate monomer content of less than 5% by weight, based on the residual contents of the emptied container. The system also includes at least one polyisocyanate or isocyanate prepolymer with a diisocyanate monomer content less than 3% by weight based on the prepolymer, an NCO functionality of 2 to 5, and an NCO content of 8 to 30% by weight based on the weight of the prepolymer with a viscosity of 5 to 200 Pa·s at 25°C.

The low content of diisocyanate monomer can be achieved as follows:

1. Using low diisocyanate monomer content prepolymer which must contain 8-30% by weight NCO groups.

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2. Introducing a trimerization catalyst into the pressurized container immediately before or after the contents are released from the container.
3. Introducing an OH containing compound into the pressurized container immediately before or immediately after the contents are removed from the container.
4. Using a cyclotrimer with a low diisocyanate content as the prepolymer.

The system of the invention comprises a disposable pressurized container containing a composition having an NCO content of from about 8 to 30% by weight, at least one catalyst for the reaction of an isocyanate group with an OH group, at least one blowing agent and at least one foam stabilizer.

The polyisocyanate or isocyanate prepolymer must have an NCO content of from about 8 to about 30% by weight based on the weight of the prepolymer. The high NCO content is required to permit the foam composition to cure rapidly so that the foam does not collapse before the cell walls are stabilized to the required extent to support the foam.

The container must also contain at least one catalyst for the reaction of the isocyanate group with an OH group. This is required again to permit the foam to polymerize at a rate sufficiently rapid to stabilize the walls of the foam cells before the foam collapses.

The system of the invention also requires the presence of a blowing agent to form the foam when the contents of the container are released.



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The composition of the present invention must also contain a foam stabilizer which provides a foam with the required cell size.

All of the components must be present in the composition for it to effectively function as a system for producing a foam. Other optional ingredients can be incorporated in the composition but the polyisocyanate or isocyanate prepolymer having an NCO content of from about 8 to about 30% by weight of the prepolymer, the catalyst, blowing agent and foam stabilizer are critical to the composition. Appellants submit that the prior art cited by the Examiner neither teaches nor suggests the present invention.

The invention stands rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Markusch et al. (U.S. 4,413,111). Appellants respectfully submit that Markusch et al. is not pertinent to the present invention.

Markusch et al. is directed to isocyanate-terminated prepolymers with low monomer content based on 4-4'-diisocyanato-dicyclohexylmethane. The Markusch et al. composition is useful in systems such as coatings, laminates, adhesives, flocculants and elastomers. As shown in the examples, the Markusch et al. isocyanate-terminated prepolymers have an NCO content of less than 2% by weight based on the weight of the prepolymer. Markusch et al. disclose a comparative example in which the prepolymer has an NCO content of 4.57% by weight and a free 4,4'-diisocyanato-

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dicyclohexyl-methane monomer of 8.1% based on the prepolymer. Hence, Markusch et al. is directed to a composition which utilizes a low NCO content prepolymer.

Appellants submit that a composition with an NCO content below 2% by weight of the prepolymer is not useful to prepare a plastic foam. Appellants submit that the cure rate of the low NCO content prepolymer is so slow that the foam collapses before sufficient cross-linking has occurred to form cell walls which can stabilize the foam. Appellants submit that one skilled in the art would realize that the Markusch et al. prepolymers would not be useful in the practice of the present invention which requires a prepolymer having an NCO content of from about 8% to 30% by weight of the prepolymer.

Appellants submit that Markusch et al. makes no reference to a foamed plastic. Appellants submit that Markusch et al. makes no reference to a foam plastic since the prepolymer formed therein, due to its low content of NCO groups, is not useful for forming a foam.

Appellants submit that a composition which cannot be used to make a foam plastic due to the low content of NCO groups, cannot anticipate or make obvious the present invention. Appellants submit that there is no incentive in Markusch et al. to modify the prepolymers disclosed therein to contain an NCO group content of from 8 to 30% by weight of the prepolymer. Appellants submit that an NCO content in a range of 8 to 30% by weight is so far outside of the range disclosed in Markusch et al. that one skilled in the art would not be led to the present invention.

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Appellants have analyzed all of the examples in the Markusch et al. reference and outside of the comparison example which has an NCO content of 4.57%, all of the examples which fall within the teachings of Markusch et al. have NCO contents of at most 1.54% (example 7). The theoretical calculated amount of NCO groups in example 5 of Markusch et al. is about 1.3% by weight of the prepolymer and the calculated NCO groups of example 6 is about 1.38% by weight of the prepolymer. Clearly, all of the examples of Markusch et al. lead one skilled in the art to a composition far different from the polyisocyanate or isocyanate prepolymer having an NCO content of from about 8% to about 30% by weight of the prepolymer critical in the present invention. Since Markusch et al. neither teaches nor suggests that the prepolymer would be useful to form a foam plastic and the NCO content is far outside of the range required to form a foam plastic, Appellants submit that a rejection based on Markusch et al. is untenable and respectfully request that the Honorable Board of Patent Appeals and Interferences reverse the Examiner.

Since the Markusch et al. composition cannot be utilized to form a foam plastic, the reference would neither anticipate nor make obvious the inclusion of a foaming agent and a foam stabilizer in the composition.

Appellants also submit that use of a low diisocyanate monomer content prepolymer is only one possible solution useful in the system of the present invention.

Disposable containers for generating foam plastic are known. However, the

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prepolymers utilized in the known systems were formed by mixing a large excess of the diisocyanate with the OH terminated diols in the container to form a useful prepolymer. However, since the compositions require a large excess of the diisocyanate, the compositions contain high amounts of unreacted diisocyanate monomer. The present invention provides a method for forming the prepolymer in the pressurized container. The container is designed to introduce an isocyanate cyclotrimer catalyst into the composition immediately before, during or after the contents have been removed from the container or introducing a low molecular weight alcohol into the container after the foam producing contents have been expelled from the container. Trimerization catalyst or the alcohol remove the diisocyanate monomer from contents of the container.

Markusch et al. requires that the prepolymer be prepared from a diol and diisocyanate monomer by a particular procedure. There is neither teaching nor suggestion of the system of the invention which utilizes a cyclotrimer of a diisocyanate as the at least one isocyanate prepolymer or that the cyclotrimer prepolymer be a mixture of hexamethylene diisocyanate trimers, isophorone diisocyanate cyclotrimers, and mixed trimers thereof.

Appellants submit that there is neither teaching nor suggestion in Markusch et al. of preforming a prepolymer by reaction of a polyol with a polyisocyanate containing NCO groups differing in their reactivity.

Appellants submit that Markusch et al. is directed to coatings, laminates,

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adhesives, flocculants and elastomers, each of which can be prepared utilizing prepolymers having a low content of NCO groups. Since there is neither teaching nor suggestion of use of the prepolymers to form a foam, which would not be possible due to the low NCO content of the Markusch et al. prepolymers, Appellants respectfully submit that the rejection is untenable and request that the Honorable Board of Patent Appeals and Interferences reverse the Examiner.

The present invention is not anticipated by Markusch et al. since there is neither teaching nor suggestion to mix with the prepolymer of Markusch et al., a catalyst for a reaction with OH groups, a foaming agent and a foam stabilizer. Appellants respectfully request that the Honorable Board of Appeals and Interferences reverse the Examiner.

Claim 15 is patentable over Markusch et al. since Markusch et al. neither teaches nor suggests a disposable pressurized container containing a polyisocyanate or isocyanate prepolymer having an NCO content of from 8% to 30% by weight based on the prepolymer, at least one catalyst for the reaction of an isocyanate group with an OH group, at least one blowing agent and at least one foam stabilizer. The compositions disclosed in Markusch et al. have an NCO group content of less than 2% by weight based on the weight of the prepolymer.

Claim 16 is patentable over Markusch et al. since Markusch et al. neither teaches nor suggests the system of claim 15 having a isocyanate monomer content of less than 2% by weight based on the total contents of the container.

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Claim 17 is patentable over Markusch et al. since there is neither teaching nor suggestion of a composition comprising the isocyanate polymer or prepolymer, catalyst, blowing agent and foam stabilizer with a diisocyanate monomer content less than 2% by weight based on the total contents of the container before application of the composition.

Claims 17, 18, 19, 20 and 21 are patentable over the prior art of record since there is neither teaching nor suggestion of a system as claimed in claim 15 containing isocyanate polymer or prepolymer having from 8 to 30% by weight of NCO groups, based on the weight of the prepolymer, and a diisocyanate monomer content within the ranges set forth in claims 17-21.

Claim 22 is not anticipated or obvious over Markusch et al. since Markusch et al. neither teaches nor suggests a polyisocyanate or isocyanate prepolymer with an NCO content of 8 to 30% by weight based on the weight of the prepolymer with a viscosity of 5 to 200 Pa-s at 25° centigrade produced from at least one diisocyanate selected from the group consisting of aliphatic diisocyanates containing 2 to 36 carbon atoms, cycloaliphatic diisocyanates containing 5 to 30 carbon atoms and /or aromatic diisocyanates containing 8 to 20 carbon atoms.

Claim 23 is patentable over the teachings of Markusch et al. since there is neither teaching nor suggestion that the prepolymer with the low NCO content be a cyclotrimer of a diisocyanate.

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Claim 24 is patentable over Markusch et al. since there is neither teaching nor suggestion that the prepolymer be a cyclotrimer of hexamethylene diisocyanate, isophorone diisocyanate and mixed trimers of hexamethylene diisocyanate and isophorone diisocyanate.

Claim 25 is patentable over Markusch et al. since there is neither teaching nor suggestion of an isocyanate prepolymer which is a prepolymer of diisocyanates or isocyanurates containing from 8 to 30% by weight of the prepolymer of NCO groups.

Claim 26 is patentable over Markusch et al. since there is neither teaching nor suggestion of a prepolymer containing from 8 to 30% by weight of NCO groups based on the weight of the prepolymer wherein the prepolymer is produced from diisocyanates with NCO groups differing in their reactivity.

Claim 27 is patentable over Markusch et al. since there is neither teaching nor suggestion in Markusch et al. of the system of the present invention comprising a pressurized container containing from 50 to 90% by weight of at least one polyisocyanate or isocyanate prepolymer containing from 8 to 30% by weight of the prepolymer of NCO groups, 0.1 to 5% by weight of a catalyst for reaction of the isocyanate groups with OH groups, 5 to 35% by weight of a blowing agent and 0.1 to 5% by weight of a foam stabilizer.

Claim 28 is patentable over Markusch et al. since there is neither teaching nor suggestion in Markusch et al. of a polyisocyanate or isocyanate prepolymer containing

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from 26 to 30% by weight based on the weight of the prepolymer of NCO groups, a functionality greater than 2.7 wherein the prepolymer is formed from MDI.

Claim 29 is patentable over Markusch et al. since there is neither teaching nor suggestion of use of polymer-MDI or a polymer-MDI prepolymer with an NCO content of from 26 to 30% by weight of the prepolymer. Markusch et al. is limited to polymers prepared from 4,4'-diisocyanato-dicyclohexylmethane which is terminated with a different isocyanate .

Claim 30 is patentable over the prior art of record since there is neither teaching nor suggestion of the system claimed in claim 29 where the MDI prepolymer is formed by reaction of MDI with a diol containing 2 to 6 carbon atoms. Appellants submit that Markusch et al. is silent concerning polymers containing from 26 to 30% by weight of NCO groups formed from MDI.

Claim 31 is patentable over the teachings of Markusch et al. since there is neither teaching nor suggestion of a polymer-MDI or polymer-MDI prepolymer having from 26 to 30% by weight of NCO groups wherein up to 50% by weight of the polymer-MDI or polymer-MDI prepolymer is replaced by at least one member selected from a group consisting of low-monomer NCO prepolymers of hexamethylene diisocyanate, tolylene-2,6-diisocyanate, isophorone diisocyanate, diphenylmethane-4,4'-diisocyanate and cyclotrimers of aliphatic diisocyanates containing 4 to 14 carbon atoms.

Claim 32 is patentable over the teachings of Markusch et al. since there is



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neither teaching nor suggestion for replacing a portion of the polymer-MDI or polymer-MDI prepolymer to produce moisture-curing foams differing in their hardness and elasticity.

Claim 33 is patentable over the teachings of Markusch et al. since there is neither teaching nor suggestion of the composition disclosed in claim 33 wherein the polymer-MDI or polymer-MDI prepolymer has an NCO content of from 26 to 30% by weight of the prepolymer. In addition, there is neither teaching nor suggestion of the catalyst, blowing agent or foam stabilizers set forth in claim 33.

Claim 34 is patentable over the teachings of Markusch et al. since Markusch et al. neither teach nor suggest a one-component foam plastic or the system of the present invention. The low NCO composition of Markusch et al. is not useful for forming a foam plastic.

Claim 35 is patentable over the teachings of Markusch et al. since there is neither teaching nor suggestion of a one-component foam plastic used as an insulating or assembly foam.

Claim 36 is patentable over the teachings of Markusch et al. since Markusch et al. is silent concerning a one-component foam plastic.

Claim 37 is patentable over the teachings of Markusch et al. since Markusch et al. is completely silent concerning a two-component foam plastic formed from a polyisocyanate or polyisocyanate prepolymer containing from 8 to 30% by weight of

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NCO groups.

Claim 38 is patentable over the teachings of Markusch et al. since Markusch et al. is completely silent concerning a two-component foam plastic formed from a polyisocyanate or polyisocyanate prepolymer having from 8 to 30% by weight of NCO groups.

Claim 39 is patentable over the teachings of Markusch et al. for the same reasons as Claim 38 is patentable over Markusch et al.

Claim 40 is patentable over Markusch et al. since Markusch et al. neither teaches nor suggests a composition comprising at least one polyisocyanate or isocyanate prepolymer having an NCO content of from 8 to about 30% by weight based on the weight of the prepolymer, a catalyst for the reaction of the isocyanate group and an OH group, a blowing agent and a foam stabilizer.

Claim 41 is patentable over Markusch et al. since there is neither teaching nor suggestion of the composition of Claim 39 having a diisocyanate monomer content of less than 2% by weight based on the total weight contents of the container.

Claim 42 is patentable over the teachings of Markusch et al. since Markusch et al. neither teaches nor suggests a composition wherein the diisocyanate monomer content is less than 2% by weight based on the total contents of the container before its application and the isocyanate polymer or isocyanate polymer prepolymer contains from 8 to 30% by weight of NCO group by weight of the prepolymer.

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Claim 43 is patentable over the teachings of Markusch et al. since Markusch et al. neither teaches nor suggests a composition containing isocyanate polymer or isocyanate polymer prepolymer containing from 8 to 30% by weight of NCO groups in the composition having less than 1% by weight diisocyanate based on the weight of the composition.

Claim 45 is patentable over the teachings of Markusch et al. since there is neither teaching nor suggestion of the composition comprising isocyanate polymers or isocyanate polymer prepolymers containing from 26 to 30% by weight of NCO groups, catalysts, foaming agents, foam stabilizers wherein the diisocyanate monomer content of the composition is less than 0.5% by weight.

Claim 46 is patentable over the teachings of Markusch et al. since there is neither teaching nor suggestion of the composition containing the catalyst, foaming agent, foam stabilizer and an isocyanate polymer or isocyanate prepolymer having from 8% to 30% by weight of NCO groups and less than 0.5% by weight of diisocyanate monomer, based on the total contents of the composition before application of composition from the disposable pressurized container.

Claim 47 is patentable over the teachings of Markusch et al. since Markusch et al. neither teaches nor suggests a composition for forming a foam plastic from a disposable pressurized container wherein the polyisocyanate or isocyanate prepolymer has a diisocyanate monomer content of less than 3% by weight based on the weight of

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the prepolymer, an NCO functionality of 2 to 5, NCO content of 8 to 30% by weight based on the weight of the prepolymer, a viscosity from 5 to 200 Pa·s at 25° centigrade wherein the prepolymer is produced from at least one diisocyanate selected from the group consisting of aliphatic diisocyanates containing 2 to 36 carbon atoms, cycloaliphatic diisocyanates containing 5 to 30 carbon atoms and/or aromatic diisocyanates containing 8 to 20 carbon atoms each with a boiling point not higher than 180°C at 10 mbar.

Claim 48 is patentable over the teachings of Markusch et al. since Markusch et al. is completely silent concerning use of an isocyanate prepolymer which is a cyclotrimer of a diisocyanate. Markusch et al. is limited to isocyanate polymers and prepolymers prepared from 4,4'-diisocyanato-dicyclohexyl-methane which can be capped with another isocyanate.

Claim 49 is patentable over Markusch et al. since there is neither teaching nor suggestion to prepare the isocyanate polymer from the group consisting of cyclotrimers of hexamethylene diisocyanate, cyclotrimers of isophorone diisocyanate and mixed trimers thereof.

Claim 50 is patentable over the teachings of Markusch et al. since there is neither teaching nor suggestion of the polymer isocyanate prepolymer having from 8 to 30% by weight of NCO groups.

Claim 51 is patentable over the teachings of Markusch et al. since Markusch et

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al. is completely silent concerning forming the isocyanate prepolymers from diisocyanates containing NCO groups with different reactivities.

Claim 52 is patentable over the teachings of Markusch et al. which neither teaches nor suggests the composition containing 50 to 90% by weight of the polyisocyanate or isocyanate prepolymer, 0.1 to 5% by weight of a catalyst, 5 to 35% by weight of blowing agent and 0.1 to 5% by weight of a foam stabilizer wherein the polyisocyanate or isocyanate prepolymer has an NCO content of from 8 to 30% by weight of the prepolymer.

Claim 53 is patentable over the teachings of Markusch et al. since Markusch et al. is completely silent concerning polyisocyanates or isocyanate prepolymer formed from polymer-MDI or polymer-MDI prepolymer with a diisocyanate monomer content of less than 20% by weight based on the polymer-MDI, an average NCO functionality greater than 2.7, an NCO content of 26 to 30% by weight based on the polymer-MDI with a viscosity of 5 to 2000 Pa-s at 25° centigrade a polymer-MDI obtained from technical MDI with an average functionality greater than 2.3 by removal of a diisocyanatodiphenylmethane.

Claim 54 is patentable over the teachings of Markusch et al. since there is neither teaching nor suggestion of the composition wherein at least one polymer-MDI or polymer-MDI prepolymer is a prepolymer formed from a polymer-MDI and a polyol.

Claim 55 is patentable over Markusch et al. since there is neither teaching nor

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suggestion of the composition wherein the polyol is a diol containing 2 to 6 carbon atoms.

Claim 56 is patentable over the teachings of Markusch et al. since Markusch et al. neither teaches nor suggests a polymer-MDI or polymer-MDI prepolymer containing at least one low-monomer NCO prepolymer comprising residues of at least one member selected from the group consisting of hexamethylene diisocyanate, tolylene-2,6-isocyanate, isophorone diisocyanate, diphenylmethane 4,4'-diisocyanate and cyclotrimers of aliphatic diisocyanates containing 4 to 14 carbon atoms. Markusch et al. is concerned with polymers containing a large portion of 4,4'-diisocyanato-dicyclohexylmethane residues.

Claim 58 is patentable over the teachings of Markusch et al. since there is neither teaching nor suggestion of the composition of claim 58 wherein the polymer-MDI or polymer-MDI prepolymer contains from 26 to 30% by weight of NCO groups and the remaining components of the composition.

Claim 59 is patentable over the teachings of Markusch et al. since Markusch et al. is completely silent concerning the composition of claim 58 and the moisture curing foam plastic .

Claim 60 is patentable over the teachings of Markusch et al. since Markusch et al. is completely silent concerning foam plastics and their possible use as an insulating or assembly material.

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Claim 61 is patentable over the teachings of Markusch et al. since Markusch et al. is completely silent concerning a one-component foam plastic used in situ which has the composition set forth in claim 40.

Claim 62 is patentable over the teachings of Markusch et al. since Markusch et al. is completely silent concerning a two-component foam plastic obtained from the compositions claimed in claim 40 by reaction of the composition thereof and a polyol.

Claim 63 is patentable over the teachings of Markusch et al. since Markusch et al. neither teaches nor suggests using the two-component foam plastic of claim 62 as an insulating or assembly foam.

Claim 64 is patentable over the teachings of Markusch et al. since Markusch et al. neither teaches nor suggests a two-component foam plastic used in situ formed from the composition of claim 40.

Claim 65 is patentable over the teachings of Markusch et al. since Markusch et al. neither teaches nor suggests, and would teach one skilled in the art away from, a composition having an NCO group content of from 8 to 30% by weight and wherein the at least one polyisocyanate or isocyanate prepolymer with the low diisocyanate content is obtained by distilling the diisocyanate from the polyisocyanate or isocyanate prepolymer.

Claim 66 is patentable over the teachings of Markusch et al. since there is neither teaching nor suggestion of the system of the invention wherein a trimerization

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catalyst is introduced into the composition immediately before or after the foam is released from the container.

Claim 67 is neither taught nor suggested by Markusch et al. since Markusch et al. fails to teach or suggest the system of claim 15 wherein the diisocyanate monomers are reacted with an OH compound added to the composition in the disposable pressurized container after a foaming period.

Claim 68 is neither taught nor suggested by Markusch et al. since there is neither teaching nor suggestion of the composition of claim 15 and adding a monohydroxy alcohol to the composition remaining in the disposable pressurized container after the foam is released.

Appellants respectfully submit that the claims in the present application are neither anticipated nor obvious over the teachings of Markusch et al. since Markusch et al. neither teaches nor suggests:

1. A system which comprises a pressurized container, a particular isocyanate polymer or isocyanate polymer prepolymer having from 8 to 30% by weight of NCO groups based on the weight of the prepolymer, a catalyst for a reaction with an OH compound, a foaming agent, and a foam stabilizer.
2. An isocyanate polymer or isocyanate polymer prepolymer having an NCO content of from 8 to 30% by weight of the prepolymer and more particularly from 26 to 30% by weight of the prepolymer.



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3. Isocyanate prepolymers prepared from diisocyanate trimers or prepolymers prepared from the diisocyanate trimers.

Appellants submit that a rejection of the claims in the present application based on the teachings of Markusch et al. is untenable and respectfully request that the Honorable Board of Appeals and Interferences reverse the Examiner.

#### SUMMARY

Appellants respectfully request that the Examiner's final rejection be reversed for the following reasons:

1. Markusch et al. neither teaches nor suggests an isocyanate polymer or isocyanate polymer prepolymer having from 8 to 30% by weight of NCO groups.
2. Markusch et al. neither teaches nor suggests the system of the invention which comprises the pressurized container containing a composition comprising an isocyanate polymer or isocyanate polymer prepolymer having from 8 to 30% by weight of NCO groups, a catalyst for reaction of the isocyanate groups with OH groups, a foaming agent and a foam stabilizer.
3. There is neither teaching nor suggestion to utilize a preformed polyisocyanate or polyisocyanate prepolymer to form the system of the present invention for forming a foam plastic.
4. The isocyanate product disclosed in Markusch et al. is not suitable for use

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as a material for forming a foam plastic since the is cyanate content is s low that the foam collapses before the cell walls are stabilized.

In view of the above discussion, Appellants respectfully request that the final rejection be reversed.

Respectfully submitted,



Daniel S. Ortiz  
(Reg. No. 25,123)  
Attorney for Appellant  
(610) 832-2220

Henkel Corporation  
Law Department  
140 Germantown Pike, Suite 150  
Plymouth Meeting, PA 19462

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APPENDIX

CLAIMS ON APPEAL

15. A system for the production of plastic foam comprising: a disposable pressurized container containing a composition comprising, at least one polyisocyanate or isocyanate prepolymer having an NCO content of from about 8% to about 30% by weight based on the prepolymer, at least one catalyst for the reaction of an isocyanate group with an OH group, at least one blowing agent and at least one foam stabilizer, wherein not later than one day after application of the plastic foam from said disposable pressurized container, the residue left in the pressurized container has a diisocyanate monomer content of less than 5.0% by weight, based on the residual contents of the emptied container.
16. The system as claimed in claim 15 wherein the diisocyanate monomer content of said composition is less than 2.0% by weight based on the total contents of the container.
17. The system as claimed in claim 16 wherein the diisocyanate monomer content of said composition is less than 2.0% by weight, based on the total contents of the container before application of the composition from said disposable pressurized container.
18. The System as claimed in claim 15 wherein the diisocyanate monomer content of said composition is less than 1.0% by weight based on the total contents of the container.
19. The system as claimed in claim 18 wherein the diisocyanate monomer content of said composition is less than 1.0% by weight based on the total contents of the container before its application from said disposable pressurized container.

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20. The system as claimed in claim 15 wherein the diisocyanate monomer content of said composition is less than 0.5% by weight based on the total contents of the container.

21. The system as claimed in claim 20 wherein the diisocyanate monomer content of said composition is less than 0.5% by weight based on the total contents of the container before application of the composition from said disposable pressurized container.

22. The system as claimed in claim 15 wherein said composition contains, before its application from said disposable pressurized container, as said at least one polyisocyanate or isocyanate prepolymer, at least one isocyanate prepolymer with a diisocyanate monomer content of less than 3.0% by weight, based on the prepolymer, an NCO functionality of 2 to 5, an NCO content of 8 to 30% by weight, based on the prepolymer, and a viscosity of 5 to 200 Pa·s at 25°C, as measured in accordance with DIN 53015, the prepolymer having been produced from at least one diisocyanate selected from the group consisting of aliphatic diisocyanates containing 2 to 36 carbon atoms, cycloaliphatic diisocyanates containing 5 to 30 carbon atoms and aromatic diisocyanates containing 8 to 20 carbon atoms, each with a boiling point not higher than 180°C at 10 mbar.

23. The system as claimed in claim 22 wherein said at least one isocyanate prepolymer is a cyclotrimer of a diisocyanate.

24. The system as claimed in claim 22 wherein said at least one isocyanate prepolymer is a cyclotrimer of a mixture of hexamethylene diisocyanate, isophorone diisocyanate, and mixed trimers thereof.

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25. The system as claimed in claim 22 wherein said at least one isocyanate prepolymer is a prepolymer of diisocyanates or isocyanurates containing NCO groups and polyols.
26. The system as claimed in claim 22 wherein said prepolymer has been produced from diisocyanates with NCO groups differing in their reactivity.
27. The system as claimed in claim 15 wherein said composition is comprised of:
- 50 to 90 % by weight of said at least one polyisocyanate or isocyanate prepolymer,
  - 0.1 to 5.0 % by weight of said catalyst,
  - 5 to 35 % by weight of said blowing agent, and
  - 0.1 to 5.0 % by weight of said foam stabilizer.
28. The system as claimed in claim 15 wherein said at least one polyisocyanate or isocyanate prepolymer is at least one polymer-MDI or polymer-MDI prepolymer with a diisocyanate monomer content of less than 20% by weight, based on the polymer-MDI, an average NCO functionality of greater than 2.7, an NCO content of 26.0 to 30.0% by weight, based on the polymer-MDI, and a viscosity of 5 to 2,000 Pa·s at 25°C according to DIN 53015, the polymer-MDI being obtained from technical MDI with an average functionality of greater than 2.3 by removal of a portion of the diisocyanatodiphenylmethane.
29. (Amnded) The system as claimed in claim 28 wherein said at least one polymer-MDI or polymer-MDI prepolymer is a prepolymer of the polymer MDI and a polyol.
30. The system as claimed in claim 29 wherein said polyol is a diol containing 2 to 6 carbon atoms.

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31. The system as claimed in claim 28 wherein up to 50% by weight of said at least one polymer-MDI or polymer-MDI prepolymer is replaced by at least one member selected from the group consisting of low-monomer NCO prepolymers of hexamethylene diisocyanate, tolylene-2,6-diisocyanate, isophorone diisocyanate, diphenylmethane-4,4'-diisocyanate, and cyclotrimers of aliphatic diisocyanates containing 4 to 14 carbon atoms.
32. The system as claimed in claim 31 wherein said replacing produces moisture-curing foams differing in their hardness and elasticity.
33. The system as claimed in claim 28 wherein said composition is comprised of:  
50 to 90 % by weight of said at least one polymer-MDI or polymer-MDI prepolymer,  
0.1 to 5.0 % by weight of the catalyst,  
5 to 35 % by weight of the blowing agent, and  
0.1 to 5.0 % by weight of the foam stabilizer.
34. A one-component foam plastic obtained from the system claimed in claim 15 by reaction of the composition thereof and moisture.
35. The method of using a one-component foam plastic as claimed in claim 34 wherein said one-component foam plastic is used as an insulating or assembly foam.
36. The method as claimed in claim 35 wherein said one-component foam plastic is used in situ.
37. A two-component foam plastic obtained from the system claimed in claim 15 by reaction of the composition thereof as a first component and a polyol as a second

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component.

38. The method of using a two-component foam plastic as claimed in claim 37 wherein said two-component foam plastic is used as an insulating or assembly foam.

39. The method as claimed in claim 38 wherein said two-component foam plastic is used in situ.

40. A composition for the production of foam plastics from disposable pressurized containers comprising at least one polyisocyanate or isocyanate prepolymer having an NCO content of from about 8% to about 30% by weight based on the prepolymer, at least one catalyst for the reaction of an isocyanate group with an OH group, at least one blowing agent and at least one foam stabilizer, wherein not later than one day after application of the composition from said disposable pressurized container, the residue of said composition left in the pressurized container has a diisocyanate monomer content of less than 5.0% by weight, based on the residual contents of the emptied container.

41. The composition as claimed in claim 40 wherein said composition has a diisocyanate monomer content of less than 2.0% by weight based on the total contents of the container.

42. The composition as claimed in claim 41 wherein the diisocyanate monomer content of said composition is less than 2.0% by weight by weight, based on the total contents of the container before application of the composition from said disposable pressurized container.

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43. The composition as claimed in claim 40 wherein said composition has a diisocyanate monomer content of less than 1.0% by weight based on the total contents of the container.

44. The composition as claimed in claim 43 wherein the diisocyanate monomer content of said composition is less than 1.0% by weight, based on the total contents of the container before application of the composition from said disposable pressurized container.

45. The composition as claimed in claim 40 wherein said composition has a diisocyanate monomer content of less than 0.5% by weight based on the total contents of the container.

46. The composition as claimed in claim 45 wherein the diisocyanate monomer content of said composition is less than 0.5% by weight, based on the total contents of the container before application of the composition from said disposable pressurized container.

47. The composition as claimed in claim 40 wherein said composition contains, before application from said disposable pressurized container, as said at least one polyisocyanate or isocyanate prepolymer, at least one isocyanate prepolymer with a diisocyanate monomer content of less than 3.0% by weight, based on the weight of the prepolymer, an NCO functionality of 2 to 5, an NCO content of 8 to 30% by weight, based on the weight of the prepolymer, and a viscosity of 5 to 200 Pa·s at 25°C, as measured in accordance with DIN 53015, the prepolymer having been produced from at least one diisocyanate selected from the group consisting of aliphatic diisocyanates containing 2 to 36 carbon



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atoms, cycloaliphatic diisocyanates containing 5 to 30 carbon atoms and aromatic diisocyanates containing 8 to 20 carbon atoms, each with a boiling point not higher than 180°C at 10 mbar.

48. The composition as claimed in claim 47 wherein said at least one isocyanate prepolymer is a cyclotrimer of a diisocyanate.

49. The composition as claimed in claim 47 wherein said at least one isocyanate prepolymer is at least one isocyanate prepolymer selected from the group consisting of cyclotrimer of hexamethylene diisocyanate, cyclotrimer of isophorone diisocyanate, and mixed trimers thereof.

50. The composition as claimed in claim 47 wherein said at least one isocyanate prepolymer is a prepolymer of at least one of diisocyanates and isocyanurates and polyols.

51. The composition as claimed in claim 47 wherein said prepolymer has been produced from diisocyanates with NCO groups differing in their reactivity.

52. The composition as claimed in claim 40 wherein said composition is comprised of:

50 to 90 % by weight of said at least one polyisocyanate or isocyanate prepolymer,

0.1 to 5.0 % by weight of said catalyst,

5 to 35 % by weight of said blowing agent, and

0.1 to 5.0 % by weight of said foam stabilizer.

53. The composition as claimed in claim 40 wherein said at least one polyisocyanate or isocyanate prepolymer is at least one polymer-MDI or polymer-MDI prepolymer with a

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diisocyanate monomer content of less than 20% by weight, based on the polymer-MDI, an average NCO functionality of greater than 2.7, an NCO content of 26.0 to 30.0% by weight, based on the polymer-MDI, and a viscosity of 5 to 2,000 Pa·s at 25°C according to DIN 53015, the polymer-MDI being obtained from technical MDI with an average functionality of greater than 2.3 by removal of the diisocyanatodiphenylmethane.

54. The composition as claimed in claim 53 wherein said at least one polymer-MDI or polymer-MDI prepolymer is a prepolymer of the polymer MDI and a polyol.

55. The composition as claimed in claim 54 wherein said polyol is a diol containing 2 to 6 carbon atoms.

56. The composition as claimed in claim 53 wherein up to 50% by weight of said at least one polymer-MDI or polymer-MDI prepolymer is replaced by at least one low-monomer NCO prepolymer comprising residues of at least one member selected from the group consisting of hexamethylene diisocyanate, tolylene-2,6-diisocyanate, isophorone diisocyanate, diphenylmethane-4,4'-diisocyanate, and cyclotrimers of aliphatic diisocyanates containing 4 to 14 carbon atoms.

57. The composition as claimed in claim 56 wherein said replacing produces moisture-curing foams differing in their hardness and elasticity.

58. The composition as claimed in claims 53 wherein said composition is comprised of:  
50 to 90 % by weight of said at least one polymer-MDI or polymer-MDI prepolymer,  
0.1 to 5.0 % by weight of the catalyst,

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5 to 35 % by weight of the blowing agent, and

0.1 to 5.0 % by weight of the foam stabilizer.

59. A one-component foam plastic obtained from the composition claimed in claim 40 by reaction of the composition thereof and moisture.

60. The method of using a one-component foam plastic as claimed in claim 59 wherein said one-component foam plastic is used as an insulating or assembly foam.

61. The method as claimed in claim 60 wherein said one-component foam plastic is used in situ.

62. A two-component foam plastic obtained from the composition claimed in claim 40 by reaction of the composition thereof as a first component and a polyol as a second component.

63. The method of using a two-component foam plastic as claimed in claim 62 wherein said two-component foam plastic is used as an insulating or assembly foam.

64. The method as claimed in claim 63 wherein said two-component foam plastic is used in situ.

65. A method of producing the system as claimed in claim 15 wherein diisocyanate is distilled from said at least one polyisocyanate or isocyanate prepolymer.

66. A method of producing the system as claimed in claim 15 wherein diisocyanate monomers are polymerized by addition of trimerization catalysts immediately before or after foaming.

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67. A method of producing the system as claimed in claim 15 wherein diisocyanate monomers are reacted with an OH compound added to the composition remaining in the disposable pressurized container after foaming.

68. The method as claimed in claim 67 wherein said OH compound is a monoalcohol.



PATENT  
Docket No. H 1215/1556 PCT/US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re: Application of Kluth et al.

Serial No. 08/702,625      Examiner: J. Cooney  
Filed: 8/23/96      Art Unit: 1207  
TITLE: FOAM PLASTIC FROM DISPOSABLE PRESSURIZED  
CONTAINERS

**CERTIFICATE OF MAILING PER 37 C.F.R. §1.8**

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231, on MARCH 26, 1998.

MARCH 26, 1998  
Date

Marlene Capresi  
Signature of certifier

MARLENE CAPRESI  
Typed or printed name of certifier

**BRIEF ON APPEAL**

Assistant Commissioner of Patents  
Washington, DC 20231

Sir:

Appellants' brief, in triplicate, is transmitted herewith in accordance with 37 CFR 1.192

Please charge the required fee of \$310.00 to our Deposit Account No. 01-1250. This paper is enclosed in triplicate. Order No 98-0336.

The Assistant Commissioner is hereby authorized to charge any deficiency in the required fee or to credit any overpayment to Deposit Account 01-1250.

Respectfully submitted,

Henkel Corporation  
Law Department  
140 Germantown Pike, Suite 150  
Plymouth Meeting, PA 19462  
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Daniel S. Ortiz  
Daniel S. Ortiz  
(Reg. No. 25,123)  
Attorney for Applicant  
(610) 832-2220